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Controlling Stormwater Discharges of Anti-sapstain Chemicals from Treated Wood Storage Areas

Volume 1

Executive Summary
and
Chairman's Final Report

BC MINISTRY OF ENVIRONMENT

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CONTROLLING STORMWATER DISCHARGES OF ANTI-SAPSTAIN CHEMICALS FROM TREATED WOOD STORAGE AREAS

Volume 1

Executive Summary and Chairman's Final Report

Anti-sapstain Chemical Leachate/Stormwater Task Force

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Controlling stormwater discharges of anti-sapstain chemicals from treated wood storage areas

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Executive Summary

In response to concerns raised by the lumber industry in the fall of 1987, the Deputy Minister of Environment and Parks struck a Task Force to review the recommended stormwater discharge levels for anti-sapstain chemicals leaching from treated lumber. The Anti-sapstain Chemical Leachate/Stormwater Task Force was requested to report its findings on July 1, 1988, for TCMTB, copper-8, and chlorophenates, which are three materials commonly used to prevent sapstains on freshly sawn lumber in British Columbia.

This report contains three major sections. Part 1 contains a final report prepared by the Task Force Chairman following completion of the work. It summarizes all the work of the Task Force, and includes recommendations and identifies various needs and management options.

Part 2 consists of two sections. The first, Part 2A, consists of a final report by the government agency members of the Task Force concerning recommendations for toxicologically-based criteria for anti-sapstain chemicals in stormwater discharges from treated wood storage areas. The second, Part 2B, consists of a covering letter from the Council of Forest Industries of B.C. (COFI) and a report prepared by Technology Resources Inc., for COFI, which is a review and critique of the report in Part 2A, and makes alternate proposals for the stormwater discharges of these chemicals.

Part 3 contains a covering letter from COFI and a report also prepared by Technology Resource Inc. for COFI, which examines potential technologies and costs for controlling the stormwater discharges of anti-sapstain chemicals.

Report Part 2A - New Government Agency Proposal

On September 15, 1987, the Province and Environment Canada jointly announced recommended maximum discharge levels for stormwater runoff containing chlorophenates, TCMTB, and copper-8. These were proposed to come into effect September 1, 1988. Following review of these recommendations, the government agency Task Force members proposed several minor revisions to these announced maximum discharge levels. Both government proposals are shown in Table 1:

TABLE 1: Government Agency Proposals for Maximum Acceptable Discharge Levels of Anti-sapstain Chemicals in Stormwater Runoff

EFFECTIVE DATE	TOTAL CHLOROPHENATES	TCMTB OR COPPER-8
Ad Hoc Committee Recommendations Announced September 15, 1987		
September 1, 1988	10 ppb	5 ppb
Final Task Force Report by Government Members*		
September 1, 1988	6 ppb	300 ppb
December 31, 1988		150 ppb
September 1, 1989		15 ppb

* The levels of TCMTB and copper-8 for September 1, 1988 and December 31, 1988 are based on 20:1 dilution being available in the receiving environment.

Report Part 2B - Counterproposal from Industry

The response of the industry members of the Task Force was to have Technology Resource Inc. prepare a rebuttal (Part 2B). These proposals are contained in Table 2:

TABLE 2: Council of Forest Industries' Response to Government Agency Proposals for Maximum Acceptable Stormwater Discharge Levels of Anti-sapstain Chemicals

EFFECTIVE DATE	TYPE	TOTAL CHLOROPHENATES	TCMTB	COPPER-8
FRESHWATER				
December 31, 1988	LTAC	300 ppb		
	STMC	450 ppb		
December 31, 1989	LTAC		1200 ppb	600 ppb
	STMC		3000 ppb	960 ppb
MARINE				
December 31, 1988	LTAC	-	-	-
	STMC	-	-	-
December 31, 1990	LTAC	-	-	-
	STMC	-	-	-

LTAC = Long-term average concentration
STMC = Short-term maximum concentration
"-" = Awaiting saltwater toxicity data

Differences Between the Two Proposals

Industry Objections

While it was agreed that some form of numerical criteria were desirable to control stormwater discharges of anti-sapstain chemicals from treated wood storage areas, and that the recommendations of September 15, 1987 should be revised, the Task Force was unable to reach a consensus . The industry representatives objected to the new scheme prepared by the government agency members for numerous reasons, including:

- the government members' proposals may not be achievable by best practicable technologies. Time will be required to determine what the best practicable technologies are.
- few trials have been carried out to determine the best practicable technologies for controlling anti-sapstain contamination of stormwater runoff.
- toxicity data for rainbow trout, not chinook salmon should be used in setting the acceptable discharge levels.
- the duration of the phase-in schedule for the government proposal is too short.
- an allowance for 20:1 dilution of the stormwater in receiving waters should be provided for ultimate target discharge levels.
- the analytical methods for environmental samples containing TCMTB and copper-8 may be unreliable and not repeatable.
- there is little information on the leaching of TCMTB and copper-8 from treated lumber during rainstorms.
- there are no precedents for setting discharge levels for contaminants in stormwater runoff.

Government Agency Objections

On the other hand, the government agency representatives objected to the industry proposals, for numerous reasons including the three major points below:

- the industry recommendations will not achieve adequate environmental protection. They will result in discharges that are extremely toxic to fish and will be in contravention of the federal Fisheries Act.
- the industry recommendations will result in chlorophenate discharges which result in B.C. ambient water quality objectives being exceeded.

- the industry recommendations for stormwater discharge criteria are derived using questionable methodologies.

Report Part 3 - Mitigative Options Report by Industry

The report prepared for COFI on the mitigative options for anti-sapstain contamination in stormwater runoff (in Part 3), focused on five general approaches: covered storage, wrapping of treated lumber, physical and chemical treatment of runoff, kiln drying, and new alternative chemicals and technologies. The result of this investigation, a report which was not reviewed by the government agency members, is that the lowest cost option, which uses pre-engineered steel covered storage, would cost the industry over $360 million in initial capital expenditure. For all options, the annual costs of operation and maintenance range from $28 to $335 million. The report concludes the current export market advantage B.C. enjoys would be seriously eroded should these costs have to be incurred, particularly if foreign jurisdictions do not require compliance with similar stormwater discharge criteria. In addition, there is little or no information on whether the various mitigation options reviewed have the ability to achieve the concentrations of anti-sapstain chemicals in stormwater as recommended in either the government or industry members' proposals.

Needs and Options - Chairman's Final Report (Part 1)

After the reports above were completed, the Task Force identified various needs and options. Great importance was placed on the need to determine best practicable technologies for controlling the leaching of anti-sapstain chemicals during rainstorms. As well it was agreed that an investigation of the leaching potential of TCMTB and copper-8 should be investigated, and that repeatable, reliable analytical methods for environmental samples containing these chemicals be developed. Numerous other immediate needs and needs that could be handled by ongoing programs were considered.

The Task Force discussed nine different options for establishing acceptable discharge levels for anti-sapstain chemicals in stormwater discharges. Several concern use of the "Code of Good Practice" for chlorophenates, but were rejected because the "Code" does not adequately address the stormwater runoff issue or chemicals such as TCMTB and copper-8. Two other options were found to be very similar to the position the government agency members had adopted. The option of recommending no discharge criteria was rejected because the Task Force agreed that these were necessary under the Terms of Reference, while the option of setting site specific criteria was dropped because insufficient information on sites was thought to be available for such an exercise. The option of adopting the levels recommended in September 1987 was reconsidered in the light of new information which indicated the levels should be revised. The remaining two options are contained in Tables 1 and 2 above.

Recommendations

The Task Force has two recommendations:

Recommendation 1. The maximum acceptable stormwater discharge levels for anti-sapstain chemicals announced September 15, 1987 be revised.

Recommendation 2. One of the two toxicologically-based proposals in Tables 1 and 2 for chlorophenates, TCMTB and copper-8 in stormwater discharges from treated wood storage areas should be considered for adoption.

PART 1

CHAIRMAN'S FINAL REPORT

CHAIRMAN'S FINAL REPORT.

CONTROLLING STORMWATER DISCHARGES OF ANTI-SAPSTAIN CHEMICALS FROM TREATED WOOD STORAGE AREAS

Anti-sapstain Chemical
Leachate/Stormwater
Task Force

June 30, 1988

Prepared by: Dr. John E.H. Ward
Task Force Chairman

Background

In September 1987, Environment Canada released a report which indicated that chlorophenates, which are registered for use to prevent the growth of sapstains, or discolouring moulds, on freshly sawn lumber, were leached off treated wood during rainstorms. The levels of chlorophenates in the stormwater discharges were considerably higher than those acutely toxic to fish, such as the chinook salmon.

Subsequently, in the early summer of 1987, an ad hoc interagency committee composed of representatives from the Ministry of Environment and Parks, Environment Canada, and Fisheries and Oceans Canada met and developed interim guidelines for stormwater discharges of anti-sapstain chemicals used in British Columbia.

These interim recommendations were announced in a news release dated September 15, 1987, as maximum acceptable concentrations:

Total chlorophenates	10 ppb (parts per billion)
TCMTB	5 ppb
Copper-8	5 ppb

In addition, where more than one chemical was used, the total maximum allowable concentration of anti-sapstain chemicals was recommended to be 10 ppb. These interim guidelines were to come into effect September 1, 1988, and were stated to be subject to review as new information became available.

In the fall of 1987, it was proposed that these interim levels be embodied in a regulation under the Waste Management Act. In response, the lumber industry, through the Council of Forest Industries of B.C. (COFI), met with senior Ministry of Environment and Parks representatives and suggested that these control levels were too stringent to be economically or easily achieved, without severely affecting the economics of overseas lumber sales.

As a result of this meeting, the Deputy Minister of Environment and Parks established the present Task Force to review and recommend control levels for the stormwater point discharge of the anti-sapstain chemicals TCMTB, copper-8 and chlorophenates into surface waters in British Columbia. It was agreed that the Task Force, whose Terms of Reference are shown in Appendix 1, would complete its work by July 1, 1988. The Task Force membership is contained in Appendix 2.

Overview of the Anti-sapstain Chemicals Addressed

At the time the Task Force was formed, three chemicals were currently registered for anti-sapstain use by Agriculture Canada: chlorophenates, TCMTB and copper-8. In a recent discussion paper, Agriculture Canada proposed eliminating all registered uses for chlorophenates, and for chlorophenols all but heavy duty, or high pressure applications. It has been widely anticipated that the legal use of chlorophenates for prevention of sapstains could end by December 31, 1988.

Of the remaining two chemicals registered for anti-sapstain use, TCMTB has found widest acceptance by industry, but there have been a number of problems with the application and the acceptance of this chemical in the workplace. Copper-8 has been used in fewer sawmills in B.C., presumably because one of its formulations, called PQ-8 has been reported to corrode equipment. A newer copper-8 formulation, NYTEC GD apparently overcomes this problem.

These three anti-sapstain chemicals are very toxic to aquatic life. The 96 hour LC50 of sodium tetrachlorophenate for chinook salmon is 30 parts per billion (ppb), while that for TCMTB is 15 ppb. Copper-8 has a similar aquatic toxicity to TCMTB, with a 96 hour LC50 for chinook salmon of 16 ppb.

A new anti-sapstain chemical called Ecobrite was registered several months ago. While the Task Force learned little about the toxicology, efficacy and environmental behaviour of this substance, it apparently is composed of borax and sodium carbonate, two relatively innocuous inorganic substances. This material was not included in the Terms of Reference of the Task Force. Several other anti-sapstain chemicals are under review for potential registration in Canada.

Overview of Task Force Activities

The Task Force took on a number of specific projects, which are listed below:

- review previously established stormwater discharge levels for anti-sapstain chemicals.
- review alternate methods for establishing discharge levels for contaminants in point source discharges.
- review toxicological information on anti-sapstain chemicals.
- review the leaching characteristics of anti-sapstain chemicals from treated lumber.
- review potential technologies for control of leachate and stormwater runoff containing anti-sapstain chemicals.

- recommend options for controlling discharges of anti-sapstain chemicals in leachate and stormwater runoff.

The Task Force approached these activities by dividing into two groups. The government representatives worked mainly on the toxicology review and discharge limits based on toxicology, while the industry representatives focused on the technologies for controlling anti-sapstain discharges in stormwater runoff. The Chairman's Final Report reviews these activities, as well as discusses needs, options, and the Task Force's final recommendations.

REPORT SECTION	REPORT TITLE AND AUTHORS
Part 2A	Toxicologically-based criteria for the stormwater discharge of anti-sapstain chemicals, June 30, 1988. Prepared by Government agency members
Part 2B	Control of anti-sapstain chemicals in stormwater runoff. Part 1: Review and critique of the agency interim sapstain report, May 1988 and covering letter from Mr. P. Gilbert to Dr. J. Ward, June 21, 1988. Prepared by Technology Resource Inc. for the Council of Forest Industries.
Part 3	Technologies for control of stormwater contaminated with anti-sapstain chemicals, June 1988 and covering letter from Mr. P. Gilbert to Dr. J. Ward, June 21, 1988. Prepared by Technology Resource Inc. for the Council of Forest Industries.

These reports are discussed in order below.

Part 2A: Toxicologically-based Criteria Report by Government Agency Members

Under point 7 of the Terms of Reference developed by the Task Force, the government members were to prepare a Draft Interim Report which contained maximum acceptable concentrations for anti-sapstain chemicals in stormwater discharges based on toxicological factors. This report, entitled "Interim Report. Anti-sapstain Chemical Leachate/Stormwater Task Force, March 1988" was prepared by the government members R. N. Dawson, J. Ward, S. Samis and D. Wilson. While the Terms of Reference indicate that the Task Force as a whole was to review and

recommend control levels, the Interim Draft Report reflects input almost solely from government Task Force members.

This draft interim report was delivered March 28, 1988 to the B.C. Director of Waste Management, the Assistant Deputy (Environment) and Deputy Ministers of Environment and Parks, as well as COFI.

The target recommendations in the Draft Interim Report are very similar to those prepared by the Ad Hoc Interagency Committee of the summer of 1987, with minor modifications. The Table below compares the recommended maximum discharge levels of each report:

EFFECTIVE DATE	TOTAL CHLOROPHENATES	TCMTB OR COPPER-8
Ad Hoc Committee Recommendations Announced September 15, 1987		
September 1, 1988	10 ppb	5 ppb
Interim Draft Task Force Report by Government Members*		
September 1, 1988	6 ppb	300 ppb
December 31, 1988		150 ppb
September 1, 1989		15 ppb

* The levels of TCMTB and copper-8 for September 1, 1988 and December 31, 1988 are based on a minimum of 20:1 dilution being available in the receiving waters.

Comparing these two schemes, the recommended target maximum concentration for chlorophenates was lowered slightly to 6 from 10 ppb to better account for the tendency of these chemicals to persist in the environment.

The target maximum concentrations for TCMTB and copper-8 were raised from 5 to 15 ppb in the absence of information that these chemicals would accumulate in organisms or persist in the environment.

The phased approach to achieving the target maximum levels for TCMTB and copper-8 was thought to provide adequate time for industry to develop effective control strategies and to switch from chlorophenates to less hazardous alternatives. The requirement for a maximum total level of 10 ppb for all three anti-sapstain chemicals from the Ad Hoc Committee was dropped.

Following receipt of the industry review of this report, which is described below, the draft interim report was revised in accordance with several comments from industry and government members. The final report is dated June 30, 1988. No changes in the basic positions or recommendations outlined in the interim draft report were made. Several speculations about industry's

reaction to the recommendations were deleted, a point about the impact of applying an acute toxicity safety factor of 0.5 was clarified, references to the human toxicity of the chemicals were removed, and a section about sampling and dilution of runoff added. The general methodology followed by the government agency Task Force members could be viewed as a model to be used to develop discharge criteria for other anti-sapstain chemicals, as they become registered and used in B.C.

Part 2B: Review of Government Members' Toxicologically-based Report by Industry Representatives and Technology Resource Inc.

Comments on the government members' Draft Interim Report were received in two phases. First, during the preparation of the report, the government members and COFI provided written and oral comments to the Task Force Chairman, who was responsible for preparing the report. Many, but not all of the comments received at this point were incorporated.

Second, COFI hired Dr. Allister Brown of Technology Resource Inc. to prepare an in depth review and critique of the Interim Draft Report prepared by the government members. This work was published in a second report, entitled: "Control of Anti-sapstain Chemicals in Stormwater Runoff. Part 1: Review and Critique of the Agency Interim Sapstain Report." It is contained in Part 2B of this report, together with a covering letter from Mr. P. Gilbert of COFI, dated June 21, 1988.

Dr. Brown brought a different approach to the task of setting of stormwater discharge levels for anti-sapstain chemicals, and also found fault with a number of specific features of the report. His report contains the following major comments:

- the available acute aquatic toxicity data for TCMTB and copper-8 were not obtained using normal quality control or assurance procedures.
- there are no precedents or documented procedures for establishing acceptable levels for contaminants in stormwater runoff.
- only toxicity data for freshwater, and not marine organisms is available for TCMTB and copper-8, and are available only for a few species.
- Acceptable discharge levels of contaminants are often set using the concept of best practicable technology. Few, if any, trials of technologies to reduce anti-sapstain chemical contaminant levels in stormwater runoff have been carried out.

- Toxicity data for rainbow trout, not chinook salmon should be used when establishing discharge levels for anti-sapstain chemicals.

- As used in the United States for wastewater discharges, both short-term maximum concentrations (STMC) and long-term average concentrations (LTAC) should be used in deriving the discharge criteria.

- Allowances for 20:1 dilution following normal Ministry of Environment and Parks practices should be provided.

- The phased-in implementation schedule timing proposed by the government members is too short. Adequate time is needed to identify and establish methods for abatement of anti-sapstain chemical leaching and to meet the prescribed stormwater levels.

- The analytical methods for TCMTB and copper-8 are not sufficiently developed. They are untested for their reliability and repeatability. It would be imprudent to proceed with discharge control criteria until the analytical methods are better established.

- The setting of these stormwater discharge controls would establish a precedent in North America which could increase costs and decrease the viability of the B.C. export lumber market.

- There is little information on the rate of leaching of TCMTB and copper-8 from treated freshly sawn lumber. Field studies on this topic should be completed before any discharge standards are put into place.

- Maximum acceptable levels of anti-sapstain contaminants in stormwater runoff should not be set lower than are achievable using proven technologies.

- The following schedule for implementation of maximum discharge levels was recommended:

EFFECTIVE DATE	TYPE	TOTAL CHLOROPHENATES	TCMTB	COPPER-8
FRESHWATER				
December 31, 1988	LTAC	300 ppb		
	STMC	450 ppb		
December 31, 1989	LTAC		1200 ppb	600 ppb
	STMC		3000 ppb	960 ppb
MARINE				
December 31, 1988	LTAC	-	-	-
	STMC	-	-	-
December 31, 1990	LTAC	-	-	-
	STMC	-	-	-

The government members on the Task Force were provided an opportunity to comment on this report, and the amended version appears in Part 2B. There is agreement on many of Dr. Brown's comments, but disagreement on several fundamental points.

Points of Agreement

- There is agreement that acceptable discharge levels for anti-sapstain chemicals in stormwater discharges from treated wood storage areas be established by government.

- There is agreement that the quality control on the bioassays for TCMTB and copper-8 was not normal.

  Comment: Since the results of a variety of aquatic species bioassays are quite consistent, it is unlikely that changes in quality control procedures would change the results significantly.

- There is agreement that it is important to ensure that the analytical methods for these chemicals are reliable.

- There is agreement that there is very little information on the leachability of TCMTB and copper-8 from lumber.

  Comment: In the event that these chemicals adhere well to lumber, it may be unnecessary to develop control strategies beyond simple good housekeeping measures. But if these chemicals do leach at a rate similar to chlorophenates, then appropriate control strategies will have to be explored. It would be useful to have the results of such leaching studies for new chemicals before they are introduced into widespread use.

- There is fairly good agreement on the timing for implementation of the target maximum discharge control levels for freshwater discharges of anti-sapstain chemicals.

  Comment: The regulatory controls for chlorophenates are proposed to be in place near the end of 1988, by both industry and government. While industry would prefer December 31, 1988, the government agency Task Force members favour September 1, 1988. For TCMTB and copper-8, regulatory controls would come into effect near the end of 1989. Industry members prefer December 31, 1989, while government members favour September 1, 1989. There is only a four-month gap between the proposals.

- There is agreement that the the best practicable technologies to reduce anti-sapstain chemical levels in stormwater discharges need to be investigated and established, and that it will take time to do this.

- There is agreement that a search for methods for setting acceptable levels of contaminants specifically in stormwater discharges did not yield positive results.

  Comment: While this may be the case, the levels of chlorophenates in stormwater discharges revealed by Environment Canada suggest that adequate controls are needed.

- Finally, there is agreement that the Ministry of Environment and Parks can require a minimum of 20:1 dilution of effluents in receiving waters.

  Comment: This arises in effluent discharge guidelines, such as the "Pollution Control Objectives for the Forest Products Industry of British Columbia," where outfall diffuser systems are used. In these guidelines, for new operations and for most discharges to freshwater, acutely toxic discharges are not allowed.

  Several other principles for effluent discharges are contained in the Ministry's "Principles for Preparing Water Quality Objectives in British Columbia," where effluent quality and dilution in an initial dilution zone "should be such that acutely toxic conditions, . . . harmful bioconcentration in biota . . . do not occur". Also, "outside of initial dilution zones, water quality should be suitable for all designated water uses, and should protect aquatic life from sub-lethal effects, as a minimum."

Fundamental Differences

On the other hand, there are very significant differences in the approaches and impacts of the government and industry members' reports, and the government agency representatives responded with three main concerns.

First, the industry recommendations above may not achieve adequate environmental protection. Second, the industry recommendations will result in discharges that cause the chlorophenate water quality objectives used in B.C. to be significantly exceeded. Third, the government Task Force members do not agree with the toxicologically-based methodologies used by industry to derive recommended maximum discharge levels.

Environmental Protection Considerations

The industry critique recommends discharge levels that are acutely toxic, and far exceed the 96 hour LC50 values for all fish species for which data are reported. The total maximum chlorophenate level was recommended to increase from 6 to 300 ppb, an increase of a factor of 50, the TCMTB level from 15 to 1200 ppb, an increase of 80 times, and copper-8, from 15 to 600 ppb, an increase of a factor of 40, from government member proposals.

In defense of their counterproposal, the industry members argue that TCMTB and copper-8 will be rapidly biodegraded beyond the initial dilution zone, that the fish will avoid acutely toxic conditions, and that 24- and 48-hour LC50 values would be more appropriate as a basis for criteria development. They also suggest that the available mitigation options cannot meet the government members' recommendations.

The government members' response to these points is that the theory that fish will avoid contaminants at these part per billion levels is unsupported, and that there is no evidence that chlorophenates or copper-8 biodegrade rapidly. They also argue that 96 hour LC50 values are traditionally used to establish effluent discharge criteria, and that, for example, the mitigation options of covering or wrapping could virtually eliminate all anti-sapstain chemical leaching during rainstorms. Finally, they respond by indicating the levels prescribed by industry will occur as high loadings during rainstorm events which can be poorly dispersed in fisheries-sensitive nearshore environments.

Considerations about Ministry Chlorophenate Water Quality Objectives

In deriving the alternate recommended discharge levels in response to the draft interim report, COFI and Technology Resources Inc. assumed a minimum of 20:1 dilution would always be available in

the receiving waters. The level of a chemical discharged into an initial dilution zone would be decreased by a factor of 20 at the outer edge of this zone. Guidelines for ambient water will apply outside the outer edge of the initial dilution zone.

While there is insufficient data to derive ambient water quality objectives for TCMTB and copper-8, a number of water quality objectives for chlorophenates have been established in B.C.:

CCREM and Ministry Approved and Working Criteria for freshwater aquatic life:

1 ug/litre	tetrachlorophenol
0.5 ug/litre	pentachlorophenol

Water Quality Objectives for the Fraser River

0.2 ug/litre	total of tri-, tetra- and pentachlorophenol

When the chlorophenate discharge levels industry has recommended are divided by 20, the results are 300/20 = 15 ppb for the long term average concentration, and 450/20 = 22.5 ppb for the short-term average concentration. These exceed the ambient water quality objectives used in British Columbia for chlorophenols by 10 - 100 times.

Methods of Deriving Acceptable Discharge Levels

Third, the members disagree about the methods for deriving anti-sapstain discharge standards.

For example, the choice of 24- and 48-hour LC50 values rather than 96-hour LC50 values is viewed by the government agency members as inconsistent with normal practice. Usually in Canada, 96 hour LC50 values are used to set effluent discharge limits, and this is the methodology the government Task Force members used.

Industry's choice of a 0.5 environmental fate safety factor for chlorophenate discharges is considered questionable and unsupported by the government members. Usually, this factor is chosen to be 0.2 in the derivation of ambient water quality criteria. Using the factor of 0.2, the long-term average and short-term maximum concentrations for chlorophenates would become 120 and 180 ppb, respectively, not 300 and 450 ppb.

The government agency Task Force members also disagree with the suggestion that discharge levels be established for both freshwater and marine environments. Normally this is done for ambient water quality guidelines, but not for effluent discharges. Obviously, there was considerable disagreement among Task Force members on the methodology for deriving acceptable discharge levels for anti-sapstain chemicals.

Part 3: Report by Industry Committee Members and Technology Resource Inc. on Mitigative Options

The second main phase of the Task Force's mandate was to review the potential technologies for control of leachate and stormwater runoff containing anti-sapstain chemicals. This has also been carried out by Technology Resource Inc. for the industry members of the Task Force. It is contained in Part 3 of this report, and is entitled "Control of Anti-sapstain chemicals in stormwater runoff. Part 3. Identification and Evaluation of Mitigative Options." An accompanying letter from Mr. P. Gilbert to Dr. J. Ward dated June 21, 1988 provides background information. The report, which was not received by government agency members in sufficient time to permit careful scrutiny, was reviewed by the industry representatives on the Task Force.

The main points in the report are as follows:

- British Columbia's sawmill industry is already leading the world in sapstain chemical application technology and environmental protection, and is absorbing major new costs as a result. The industry's use of new chemicals is presenting many new management challenges, and is reflective of industry's response to environmental and other concerns.

- The extent of leaching of TCMTB and copper-8 from treated lumber should be established before industry is committed to expensive controls whose effectiveness has yet to be proven.

- Five categories of mitigative options and technologies to reduce the levels of anti-sapstain chemicals in stormwater runoff were evaluated: covered storage areas, wrapping of treated lumber, treatment of stormwater runoff, kiln drying of all export lumber, and new alternative chemicals and technologies. These options have potential to reduce the anti-sapstain chemical levels, but their effectiveness is unproven. The report suggests there are no easy answers.

- The lumber industry-wide costs per annum to implement stormwater anti-sapstain discharge controls in B.C. fall into the range $28 to $335 million. Capital costs are estimated to exceed $360 million for the lowest cost option.

- The cost of all the options will seriously erode the current export market advantage of B.C. lumber products.

- A summary of key points about each option is shown below, based on a theoretical, typical mill producing 100 MM fbm annually. Technical ratings are based on engineering judgment for control of anti-sapstain chemicals in stormwater runoff, impacts on worker safety, and impacts on export markets.

Covered Storage

- Pre-engineered steel has highest technical rating.
- Lowest capital and operating cost - $ 8 per M fbm.
- 2 - 3 year implementation time required.

Wrapping of Treated Lumber

- Lower technical rating due to disadvantages, including need to account for humidity in package, disposal costs, and occupational exposures.
- Estimated cost of polyethylene wrap is $ 17 per M fbm, breathable shrink wrap at $ 12 per M fbm.
- 6 months - 5 year implementation time required.

Physical and Chemical Treatment of Runoff

- Rated lower technically - treatability of most chemicals not established.
- Some waste disposal problems expected.
- Cost range from $ 24 per M fbm for dry, to $ 30 per M fbm for wet areas.
- 1 - 2 year implementation time required.

Kiln Drying

- Excellent control to reduce anti-sapstain chemical discharges, because less or no chemicals are used.
- 50% of lumber is too large to dry.
- Poor market for kiln dried coastal lumber.
- Cost range from $90 to $134 per M fbm.
- 2 year implementation time required.

Replacement of Anti-sapstain Chemical, Use of Sealers, More Efficient Spray Systems

- All have unproven effectiveness.
- 1 - 10 year implementation required.

Discussion of Needs and Information Gaps

This section of the Chairman's Final Report focuses on two major items: a review of needs and information gaps, and a description of a number of management options for stormwater discharges of anti-sapstain chemicals.

The needs and information gaps were discussed and placed into two categories: those requiring immediate attention and those that could be addressed by ongoing programs.

Immediate Needs

1. the development and implementation of a research program to determine the leaching rates and characteristics of anti-sapstain chemicals on treated wood.

   Comment: while there is considerable information on the leaching of chlorophenates, little is known about the leaching of TCMTB or copper-8.

2. the determination of current levels of stormwater discharges of anti-sapstain chemicals other than chlorophenates from treated wood storage areas.

   Comment: Apparently only levels of chlorophenates in stormwater discharges have been measured.

3. the development of repeatable, reliable analytical methods for anti-sapstain chemicals, other than chlorophenates, in environmental matrices.

   Comment: Some Task Force members repeatedly questioned the ability of the analytical methods being developed by the Ministry of Environment and Parks' Environmental laboratory to meet the required detection limits required by the maximum acceptable levels recommended by the government agency members. They also questioned the ability of the current methods to provide repeatable, reliable results for environmental samples such as sludges and heavily contaminated stormwaters.

4. the determination of what constitutes the best practicable technologies to reduce stormwater anti-sapstain chemical discharges to acceptable levels.

   Comment: It was agreed that there may be questionable value in setting anti-sapstain chemical stormwater discharge criteria that could not be met by the application of best practicable technologies.

5. the evaluation of the recommended acceptable stormwater anti-sapstain chemical discharge levels in the light of best practicable technologies.

   Comment: If it were determined that best practicable technologies were incapable of meeting the recommended discharge levels, then re-evaluating those levels could be considered.

6. the further determination of the impact of the recommended discharge levels on the economic viability of industry.

Comment: While some idea of the economic impact of different applicable technologies was discussed in the Part 3 report prepared by Technology Resource Inc. for COFI, Industry Task force members indicated a need to refine these estimates further. Also, government agencies need to have an adequate opportunity to review the proposed technologies and cost estimates.

Upon reviewing these six points, the Task Force agreed that all but points 4 and 5, which involve the determination of best practicable technologies, could be satisfied within 6 months.

Needs That Can Be Addressed by Ongoing Programs

1. an increase in the number of anti-sapstain chemicals that could be used in view of the anticipated phase-out of chlorophenates.

   Comment: With a phase-out of chlorophenates being suggested for the end of 1988, there are few other chemicals registered for use that could be quickly adopted for widespread use by industry: TCMTB, copper-8 and Ecobrite. Industry would appreciate a wider choice, in view of the several important unknowns concerning the latter two chemicals.

2. the development of good anti-sapstain efficacy data on these new chemicals.

   Comment: More needs to be known about the efficacy of copper-8, Ecobrite and other alternate chemicals.

3. the evaluation of how quickly industry can move to meet the recommended criteria and adjust its implementation schedule accordingly, earlier or later.

   Comment: Together with the determination of what constitutes best practicable technologies comes the need to find out how quickly those technologies can be implemented.

4. the review of appropriate methods to set general stormwater discharge levels for anti-sapstain chemicals in Canada.

   Comment: The Task Force discovered that the setting of discharge criteria for stormwater discharges is new, and similar work being carried out in other jurisdictions was not found. Some members feared that the work of the Task Force would set a precedent for other stormwater discharges, for example in agricultural or urban runoff.

5. the development of an aquatic toxicity database on anti-sapstain chemicals other than chlorophenates so ambient water quality criteria for these chemicals may be determined.

   Comment: If sufficient data were available to develop ambient water quality criteria for TCMTB and copper-8, in theory the maximum acceptable discharge levels of these chemicals could be back calculated by multiplying the criteria by the minimum dilution allowed. While this procedure is not acceptable to all agencies on the Task Force, it is nevertheless interesting to consider the results of the calculations. For the ambient water quality criteria used in B.C. for chlorophenols, which were described earlier, and using a dilution factor of 20, this would give a maximum acceptable discharge level of 4 to 20 ppb, a range which brackets the 6 ppb level recommended by the government agency members.

6. the stimulation and funding of research on alternate chemical application technology (electrostatics) and non-chemical sapstain control strategies such as irradiation and travel sealers.

   Comment: the development of new methods to protect wood from sapstains, to use less anti-sapstain chemicals, and to prevent chemicals from leaching should be explored.

7. the further investigation of the environmental fate and impacts of anti-sapstain chemicals other than chlorophenates.

   Comment: The Task Force received virtually no information about the environmental fate of copper-8. A number of important questions about TCMTB remain unanswered.

8. the re-evaluation of acceptable stormwater discharge levels of anti-sapstain chemicals, to take into account new information as it is received.

Discussion of Options

The Task Force, after reviewing all three reports, discussed nine options concerning the establishment of acceptable discharge levels for anti-sapstain chemicals in stormwater. These options are discussed in turn below:

Option 1. Do not establish numerical anti-sapstain chemical discharge criteria.

Comment: This option was dismissed because the Task Force felt that there was a serious enough problem to warrant the establishment of some numerical discharge limits and a schedule for their implementation. As well, it would represent a rejection of the Terms of Reference and goals of the Task Force.

Option 2. Do not establish numerical anti-sapstain chemical discharge criteria but enforce the "Code of Good Practice" for chlorophenates.

Comment: This option was rejected for the same reason as option 1. As well, the "Code of Good Practice" does not adequately address the factors that are believed to cause unacceptable levels of anti-sapstain chemicals in stormwater runoff. The "Code" needs to be revised and expanded to include anti-sapstain chemicals other than chlorophenates.

Option 3. Adopt the maximum acceptable discharge levels announced in September 15, 1987.

Comment: Since the recommended maximum stormwater discharge levels of chlorophenates, TCMTB and copper-8 were announced in September 1987, significant new information about the environmental fate of TCMTB has been received. In addition, a review of the literature since that time has suggested that a different safety factor for persistent and bioaccumulative chemicals be applied in the derivation of water quality guidelines. As well, no information was received about the environmental fate of copper-8, so in the absence of information on this topic it was decided to assume copper-8 was biodegradable, and not persistent. Previously the ad hoc government agency committee assumed copper-8 did persist and bioaccumulate. The recommended maximum acceptable discharge levels of TCMTB, chlorophenates, and copper-8 have been adjusted according to this rationale, and it was agreed that the former recommendations should be updated.

Option 4. Adopt government Agency recommendations as described in the Part 2A report.

Comment: While these recommendations were acceptable to the government agency representatives, they were not acceptable to those on the Task Force from industry. The reasons for these differences have been discussed previously. Possible changes in the phase-in schedule were not discussed.

Option 5. Adopt industry's recommendations as described in the Technology Resource Inc. report in Part 2B.

Comment: While industry supports these recommendations as practical and achievable within the suggested time allocated, the government representatives have indicated the discharge levels will not adequately protect the environment or meet established water quality guidelines for chlorophenols in B.C. Possible changes in the timing of the implementation schedule were not discussed.

Option 6. Adopt a different toxicological control methodology.

Comment: The Task Force focused its attention on setting discharge limits for anti-sapstain chemicals based on levels of individual chemicals. Another route would be to manage stormwater discharges by implementing controls on the overall toxicity of the discharge, for example, by setting the maximum toxicity in the discharge at the 96 hour LC50. Several Task Force members pointed out that this proposal was actually very similar to the government agency proposal in Option 4, where the maximum acceptable level of TCMTB and copper-8 is set at the 96 hour LC50 level for chinook salmon. They also suggested that this approach would not be acceptable for chlorophenates, because these substances tend to bioaccumulate and persist, and would have to be controlled more restrictively than would occur through the use of the 96 hour LC50 value.

Option 7. Use a permit system and set site-specific controls.

Comment: Several Task Force members suggested that the setting of different maximum acceptable discharge levels on a site-specific basis would require much more site-specific information than is currently available, and could not be practically carried out.

Option 8. Use Federal legislation to set discharge controls.

Comment: Under the federal Fisheries Act, toxicity greater than the 96 hour LC50 value for a sensitive fish species is sometimes used as an indicator of a "deleterious" condition. It was pointed out that this option has basically the same effect as options 4 and 6.

Option 9. Carry out an environmental monitoring program, implement and enforce the "Code of Good Practice", and adopt levels achievable by the best practicable technology when they are determined.

Comment: As under option 2, the "Code of Good Practice" for chlorophenates does not adequately address the issue of controlling anti-sapstain contamination of stormwater runoff at treated wood

storage areas. The implementation of a new monitoring program would not satisfy the immediate need for government agencies to control these discharges, and leaves open the possibility of a long wait before the best practicable technologies can be determined and implemented.

Of the nine options, all but option 4 and option 5 were found unacceptable by the Task Force. However, the Task Force was unable to come to a consensus on which of these last two options would meet the needs of both government and industry.

Recommendations

The Task Force has two recommendations:

Recommendation 1. The maximum acceptable stormwater discharge levels for anti-sapstain chemicals announced September 15, 1987 be revised.

Comment: The reasons for this are discussed under option 3 above.

Recommendation 2. One of the two toxicologically-based proposals for chlorophenates, TCMTB and copper-8 in stormwater discharges from treated wood storage areas should be considered for adoption. The two proposals have been reprinted from the Part 2A and 2B reports in Tables 1 and 2.

Comment: The Task Force was unable to agree on a single set of toxicologically-based discharge levels. Fairly close agreement was achieved concerning the timing of compliance with the target levels, but not on the target levels themselves.